

Update on Endowment Net-Zero Goal

March 2022

Executive Summary

The endowment's mission is to support both current and future generations at Penn. Totalling \$20.5 billion as of June 30, 2021, the endowment will distribute over \$800 million this fiscal year to fund scholarships, teaching, research, medical innovation, and thousands of other programs and initiatives across the University. Penn's Office of Investments manages the endowment on a day-to-day basis, overseen by an Investment Board consisting of University trustees. The Office invests the endowment by partnering with external investment management firms who in turn select individual companies in which to invest. Penn's investment manager relationships span the globe, encompassing investments across a range of asset classes and strategies.

In April 2021, the Office of Investments set a goal of reducing the net anthropogenic greenhouse gas emissions associated with the endowment's investments to zero by 2050. Over the past eight months, we have collaborated with Penn's Investment Board to develop a framework for achieving net zero. These guiding principles in turn have helped to shape our initial focus and activity. We are excited to update the Penn community on our research, engagement, and investment efforts to date in support of our net-zero goal.

We designed our initial efforts around two guiding principles. First, we will implement our goal in a manner consistent with our responsibility to support the endowment's core mission. Risk-adjusted return maximization and decarbonization can and should go hand in hand. Second, our efforts should not only reduce the endowment's emissions, but must also drive decarbonization of the real economy. With this framework in mind, we have launched a range of initiatives over the past eight months. We have begun to attack the data and methodological challenges that we will need to resolve in order to calculate a credible estimate of the portfolio's emissions. At the same time, we have initiated engagements with our investment partners around positions with higher emissions footprints. Finally, the Office has developed a growing portfolio of investments that can both generate attractive risk-adjusted returns and support real-world decarbonization.

Principles of Implementation

The University's primary investment goal is to maximize long-term endowment returns to support both current and future generations at Penn. Transitioning the portfolio to net-zero carbon emissions, if implemented thoughtfully, is not only consistent with this mission but also may be necessary to meet our long-term return targets. Climate change and the energy transition are creating both opportunities and real business and physical risks for investments. We and our investment partners must incorporate thoughtful assessments of these risks into existing and new investments.

Our second guiding principle is to pursue our net-zero goal in a manner that contributes to the decarbonization of the real economy. Business models, infrastructure, technology, and government policies must all evolve quickly if the world is to limit warming. Penn's managers have made numerous investments in companies developing new technologies that will drive and support decarbonization. But most companies are not in the business of creating radically new technology. Instead, to decarbonize, they must innovate around their business models, supply chains, distribution networks, and all other aspects of their operations. Investor encouragement and support for boards and management teams contemplating such changes will be critical to their success. Investors truly desiring a decarbonized economy therefore do not

have the luxury of indiscriminately selling today's high emitters and assuming that someone else will support or create change. Like a country that claims to have improved its own emissions by importing goods from abroad rather than manufacturing domestically, such an approach would simply reallocate emissions to other owners.

Instead, we believe the endowment can support—and potentially even accelerate—necessary changes in business models and technologies that must occur within the real economy. The University's own efforts to decarbonize its operations serve as an immediate example of how an organization can make meaningful real-world reductions to its emissions footprint. We believe our net-zero goal can be most powerful when it supports, encourages, or even pushes companies to make such changes. Later in this update, we discuss our efforts to date along this dimension.

It is important to emphasize that our guiding principles of risk-adjusted return maximization and real-world decarbonization are not a license to wait and hope. Rather, they have spurred our initial efforts around research, engagement, and investment. In the following sections, we detail our efforts and progress in these areas.

Research

The Office is spending significant time tackling the challenge of measuring the carbon emissions footprint of the endowment. To calculate the portfolio's footprint, we need to gather data for underlying companies and assets and aggregate it at the endowment level. Today, the availability, consistency, and accuracy of carbon emissions data from portfolio companies are limited, particularly beyond larger public companies. Given the costs of measurement and accounting, only a subset of companies has devoted resources to systematically measure, monitor, and report emissions footprints. In the absence of reported numbers, many data providers and consultants estimate company emissions using models based on high-level characteristics such as industry and size. Since it will likely be years before most companies report their emissions, estimation models may be a necessary part of portfolio assessments for some time. Preliminary research on the topic, however, suggests that outputs from these models often prove to have been poor estimates once a company's carbon emissions are actually measured. Although it is therefore difficult to have high confidence in the accuracy of the estimates, they do help to highlight companies that are likely to be material contributors to the portfolio's emissions footprint. We expect that, for the foreseeable future, model estimates will be most useful to us in this way.

Beyond our work on the availability and quality of data, there are also several key methodological questions we are evaluating. Carbon accounting frameworks are beginning to coalesce around answers for some of these questions, but other issues appear further from resolution. For example, there is a preponderance of agreement that the emissions associated with a company should be allocated to both the equity and debt securities of the company. In contrast, there is less consensus thus far about how derivatives that synthetically replicate long or short equity exposure to a company should be treated. We have engaged in conversations with carbon accounting organizations, data providers, and other investors to share ideas and advocate for thoughtfully constructed frameworks.

It is important to note that the Office's work on a variety of net-zero topics has benefitted from the deep expertise of Penn's faculty. We are engaged in conversations with members of Penn faculty on subjects ranging from carbon emissions measurement to the cost competitiveness of various carbon sequestration technologies. For example, as we considered the carbon footprint of our real estate portfolio, we spoke with members of Penn's Facilities and Real Estate Services team to learn from their progress driving the decarbonization of the campus. Team members helped educate us on best practices and common challenges when measuring absolute and intensity footprints for real estate properties. We, in turn, used these learnings

in a series of conversations with our real-estate-focused investment partners about their progress in measuring carbon emissions and initiatives to decarbonize their portfolios. Beyond Penn, we are drawing on a wide range of resources, including climate data providers and consultants. As mentioned, we are collaborating with our peers to discuss key methodological questions for portfolio carbon accounting. We have also participated actively in industry collaborations and roundtables to exchange ideas.

While our research is ongoing, the significant data and methodological challenges that still exist mean we cannot yet calculate a credible estimate of the endowment's emissions footprint. An inability to quantify our footprint today, however, does not constrain us from making progress towards our net-zero goal. In the following sections, we describe our strategies for engaging with our investment partners and for identifying investments that are directly driving real-world decarbonization.

Engagement

Our primary efforts to navigate the energy transition will be through our investment partnerships. We are already engaging and collaborating with our investment partners as they assess the risks from emissions footprints and from climate change more broadly. To date, we have been encouraged by the thinking and rigor our partners have brought to these efforts. While many are extremely early in their progress towards measuring portfolio emissions, our conversations have highlighted their keen awareness of sources and risks of emissions, an understanding of the paths that companies must take to improve emission footprints, and a demonstrated willingness to engage with portfolio companies around this topic.

One initial focus for engagement around our net-zero goal has been to understand the risks and trajectories of investments in the endowment with higher emissions footprints. Over the past months, we worked with a third-party provider of emissions data to assess the carbon intensity of publicly listed companies within Penn's portfolio.¹ While reported emissions do not yet exist—even for many public companies within the endowment—and while we know specific estimates are of questionable accuracy, we believe that the analysis highlights companies likely to have higher carbon intensities. The results have driven a set of ongoing engagements with Penn's managers focused on these particular companies. Our initial goals were to understand not only our partners' assessments of the risks posed by the emissions profiles, but also what paths the companies are on towards meaningful decarbonization of their businesses.

In general, our partners have constructive and engaged relationships with the public companies in which they invest. This leaves them well-positioned to not only assess the companies' decarbonization plans, but also to advocate for necessary improvements. We were encouraged that our conversations highlighted significant depth of research, thought, and company engagement by our partners. We systematically discussed the current and future risks created by portfolio companies' emissions profiles, the ability and willingness of these companies to reduce their footprints, our partners' plans for communication with companies on the topic, and how our managers would evaluate whether to remain invested in the companies going forward.

Our initial conversations with our partners have also helped us to refine our framework for supporting real-world decarbonization. Ultimately, for companies with higher current emissions intensities to be attractive long-term investments, we believe they should have clearly articulated business plans for reducing emissions, they should show tangible progress towards their goals through time, and their relative emissions intensity within an industry should leave them competitively advantaged in a world where carbon is priced appropriately. If Penn's managers choose to remain engaged owners in such companies, they should

¹ Carbon emissions reflect a company's absolute emissions, expressed in tons of carbon dioxide equivalent. Carbon intensity incorporates the concept of efficiency by normalizing a company's absolute emissions by the level of annual sales the company produces (tons of carbon dioxide equivalent per million dollars of sales).

monitor these aspects regularly. If the companies are not responsive to constructive proposals for emissions reduction, or if they fail to show credible progress towards meaningful goals, then we will expect our partners to make a rigorous evaluation of whether the positions remain appropriate investments.

Sustainability-Related Investments

The transition from a high-carbon to a low-carbon economy will require a massive amount of capital, creating significant investment opportunities over the coming decades. As part of our net-zero goal and consistent with the charge given to the Office by the Trustees to explore investments that contribute to or benefit from the energy transition, we have increasingly evaluated transition-related investments. Over the coming decades, we expect these opportunities to span industries, business models, and asset types.

The Office views sustainability-related investments not as a separate sector or industry vertical, but rather as an opportunity set that extends throughout the real economy; we have organized our investment efforts in concordance with this view. A dedicated team consistently reviews sustainability-focused opportunities across all asset classes, though always in conjunction with the relevant asset class team(s) for each prospective investment. This structure allows Penn to focus our sourcing efforts and to develop comparative insights across sustainability-related opportunities, while still ensuring that all investments compete appropriately for capital within and across asset classes.

Penn's sustainability-focused investments grew materially in 2021. Penn recently made capital commitments to two venture capital funds that support the development of technologies necessary for energy transition and decarbonization. While the firms have different areas of specific focus, they invest in startups across sectors including mobility, energy, and materials, with many portfolio companies seeking to develop technologies that will help avoid or sequester significant emissions. Penn also co-invested alongside one of these managers in a lithium-ion battery recycling company that is seeking to improve the cost and sustainability of electric vehicle battery production. Our investments are consistent with our primary goal of maximizing long-term returns, but all three will also actively contribute to the decarbonization of the real economy.

Notably, Penn's exposure to sustainability-related investments is not limited to dedicated fund commitments. Penn's generalist managers are increasingly finding compelling opportunities related to the energy transition. This natural increase is encouraging because it highlights the increasing volume and scale of sustainability-related investments now competing on a risk-adjusted basis with a broader set of opportunities. The scope of business models and sectors across these investments also reflects the increasing importance of sustainability in nearly all corners of the economy. Penn's managers have investments across the electric vehicle value chain, including in battery manufacturers, EV manufacturers and assemblers, charging infrastructure providers, and a service and software provider that helps develop and manage EV charging stations. A number of Penn's generalist partners have made investments in renewable energy and battery storage companies over the past year. Another invested in a company converting landfill gas into lower-carbon products. One private equity manager acquired a manufacturer of specialty hydrogen compression systems that support hydrogen as an alternative source of energy in hard-to-abate transportation industries like heavy trucking. Another manager invested in a company providing engineering services to utilities, renewable energy producers, and battery storage companies. One of Penn's partners backed a consulting firm providing sustainability expertise in climate, water, energy, and other sectors, while another invested in a manufacturer and distributor of solar glass for installation in downstream photovoltaic projects. Finally, several Penn managers have invested in plant-based food startups, including a variety of plant-based meat, milk, and cheese producers that hope to reduce the significant carbon footprint of the livestock sector.

We are enthusiastic about our sustainability-related investment partnerships and the growing set of sustainability-linked investments our generalist partners are finding. We expect our exposure to such investments to grow both organically and through new commitments over time. These investments should generate strong returns for Penn, contribute to the overall decline in the carbon intensity of the endowment, and, critically, contribute to the needed decarbonization of the real economy.